

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A23K 1/14, 1/18	A1	(11) International Publication Number: WO 99/22604 (43) International Publication Date: 14 May 1999 (14.05.99)
(21) International Application Number: PCT/GB98/03256 (22) International Filing Date: 30 October 1998 (30.10.98) (30) Priority Data: 9723059.3 31 October 1997 (31.10.97) GB (71) Applicant (for all designated States except US): MARS UK LIMITED [GB/GB]; 3D Dundee Road, Slough, Berkshire SL1 4JJ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): FONE, Janel [GB/GB]; Pedigree Pet Foods, Mill Street, Melton Mowbray, Leicestershire (GB). (74) Agents: CORNISH, Kristina, Victoria, Joy et al.; Kilburn & Strode, 20 Red Lion Street, London WC1R 4PJ (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: PET FOOD CONTAINING CHICORY		
(57) Abstract The present invention relates to a pet food product which comprises chicory in an amount which maintains good faeces quality or improves the faeces quality of a pet and/or maintains good gastrointestinal tract health or improves the gastrointestinal health of a pet. It also relates to the use of chicory in achieving these results, a method for achieving them and a process for the preparation of such a pet food product.		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

PET FOOD CONTAINING CHICORY

5 The present invention relates to a pet food product which comprises chicory in an amount which maintains good faeces quality or improves the faeces quality of a pet and/or maintains good gastrointestinal tract health or improves the gastrointestinal health of a pet. It also relates to the use of chicory in achieving these results, a method for achieving them and a process for the preparation of such a pet food product.

10 The maintenance and improvement of pet health is a constantly ongoing aim in the art. Pet health can be monitored in a number of ways. Two of these are faeces quality and gastrointestinal (GI) tract health. Good quality faeces in pet animals is of two-fold importance. Firstly, it is a good indicator of a healthy pet. It is known that good faeces quality usually reflects healthy colonic structure and function.
15 Secondly, it is a much favoured practicality for pet-owners. Accordingly, the maintenance of good quality pet faeces and the ability to improve the quality of pet faeces is a constantly ongoing aim in the art. It is also an ongoing aim in the art to improve the GI tract health of pet animals. The ability to maintain and improve GI tract health can be beneficial to pet owners because it has an impact on their pet's
20 overall health.

One method for maintaining normal gastrointestinal function and ameliorating chronic diarrhoea in animals has included the addition, in pet food products, of a fibre source which contains a significantly higher proportion of insoluble fibres to
25 soluble fibres, which are either non-fermentable or only moderately fermentable. EP-A-0 674 842 teaches that maintaining normal gastrointestinal function in pets is important and teaches that beet pulp produces the best results. Zentek, J., in J. Anim. Physiol. a. Anim. Nutr. 75 (1996), 36-45, confirms the teaching in EP-A-0

674 842 regarding the use of fairly insoluble fibre sources as advantages on the nutrient digestibility and microbial metabolism of the intestinal tract in dogs and describes that fairly soluble fibre sources such as guar gum and pectin may induce an undesired smeary faecal consistency.

5

The present invention provides a fibre source, the use of which results in: i) Significantly improved (or maintenance of good) faeces quality and/or ii) Significantly improved (or maintenance of good) gastrointestinal (GI) tract health, in pet animals over the fibre sources of the prior art. The improvement of the faecal quality and/or GI tract health according to the present invention is completely unexpected. One reason for this includes the fact that the fibre used is primarily soluble (compared to the insoluble fibres previously taught to give good faeces quality) and since the fibre appears to be more rapidly fermentable than fibres used in the prior art. The rapid fermentation of the fibres has, to date, been considered by a person skilled in the art as a potential cause of diarrhoea in pet animals.

10
15

Accordingly, a first aspect of the invention provides a pet food product which comprises chicory in an amount which: i) maintains good faeces quality or improves the faeces quality of a pet and/or ii) maintains good GI tract health or improves it.

20

The present invention demonstrates that the incorporation of chicory fibre into a pet diet, in one facet, results in the maintenance of good faeces quality and/or the improvement in faeces quality in the pet. In a further facet, the incorporation of chicory into a pet food product results in the maintenance of a healthy GI tract or improves the health of the GI tract.

25

Chicory is a blue flowered plant (*Cichorium intybus* [named ENDIVE in the US]) which is cultivated for its salad leaves and its root (roasted and ground for use with, or instead of, coffee). Its primary components are i) inulin and ii) soluble and

fermentable fibres. Inulin is a soluble polysaccharide, composed of polymerized fructose molecules, occurring as stored food material in many plants, such as members of the Compositae and in dahlia tubers. However, it is not the endogenous inulin of chicory, but rather the fibre, which imparts the advantageous effect in maintaining and/or improving faecal quality in pet animals. This is demonstrated herein by the fact that chicory plant, which has had the majority of the inulin extracted (resulting in a chicory pulp) provides the most useful and effective form of chicory fibre for the present invention and by experiments by the inventors (data not shown) which have shown that the addition of inulin, without the chicory fibres, does not improve faeces quality in pet animals.

The chicory plant itself can be incorporated into an animal pet food in order to provide a pet food product according to the first aspect of the invention. The quantity of the plant to be incorporated, in order to provide sufficient fibre, can be determined in a straightforward manner by measuring plant quantity and feeding to pet animals in order to determine a range of amounts which: i) maintains good faeces quality or improves the faeces quality of a pet and/or ii) maintains good GI tract health or improves it. The quantity of chicory plant to be included may vary somewhat due to a variety of factors such as the plant type, the plant age, the part of the plant etc.. The root of the plant is preferred as it provides a higher dry matter content over other parts of the plant, such as the stem, leaf and/or flower which may also be used.

However, the incorporation of chicory plant itself is not necessary in accordance with the invention. It is actually preferred that the first aspect of the invention is formulated by the inclusion of fibre-containing chicory plant extract (or the remains of the plant following extraction of other material). Suitable extracts/remains include those where some or most of the inulin has been removed (extracted) to

leave a chicory pulp. The inulin content may be anything from less than 0.25%, less than 0.5%, from 0.5% to 1%, preferably from about 0.3% to about 0.8% on a dry matter basis of the total pet food product. The exact content of any chicory pulp will depend on the extraction process which has been used. Extraction of inulin from chicory plants is known in the art and has been practised since as long ago as 1927.

The most common extraction process is of chicory root and is similar to the extraction of sucrose from sugar beet (diffusion in water). The extraction removes inulin to leave a chicory pulp. Preferably, according to the invention, as much inulin is removed as possible, resulting in a chicory pulp which has a high fibre content. Typical extraction processes usually result in a chicory pulp containing up to around 45% dietary fibre, as measured by the Englyst method and only around 5 to 10% inulin (remainder of the pulp provides approximately 12% water, 9% protein, 1% fat, 9% ash, and up to 19% carbohydrate). The present invention includes all chicory pulp which can be obtained from chicory plants, including the whole range of possible fibre and inulin content. The pulp is preferably obtained from at least chicory root material. The chicory pulp may be incorporated into a pet food product with the same composition as directly produced from the extraction procedure. Alternatively, the pulp may undergo one or more steps to obtain a pulp of a different composition and/or form. For example, the pulp may be dried and then ground up to provide a dry product of small particle size which may be used to produce a pet food according to the first aspect of the invention. In accordance with the invention, it is the ultimate pet food product, with a chicory fibre content, which is important.

25

Without limiting the present invention, the addition of chicory fibres into a pet food product is believed to i) maintain good faeces quality or improve the faeces quality of a pet and/or ii) maintain good GI tract health or improve it, either achieved by

one or more of the following: the improvement of faeces water binding, the reduction of faecal pH, the improvement of colonic flora, the enhancement of populations of beneficial bacteria, the enhancement of water/electrolyte uptake in the gastrointestinal tract, the improvement of colonic structure/health and the provision of good water binding features to equalise faecal texture, possibly achieved by the way that the natural fibres are bound in the structured chicory fibre matrix which gives unique benefits not seen with other fibres.

Evaluation of faeces quality and the identification of improvement of faeces quality are techniques well known and used in the art. More than one method can be used (alone or in combination). Methods commonly use a panel of trained observers (may be trained members of the public or professionals). Faecal samples from a pet are collected and may be scored according to a rating system such as described in EP-A-0 674 842, or (a rather more sophisticated scale) according to a rating system based on a linear scale as follows:

- 0-2.5 diarrhoea - unformed stools
- 2.6- 5 unformed - soft formed, moist
- 5.1-7.5 soft formed, moist - firm, formed
- 7.6-10 firm formed - hard, dry pellets

The evaluation of good faecal quality is determined according to faecal quality which often reflects a normal gastrointestinal function. This is usually the formation of a stool which is firm and retains its shape. Stools which are hard, pellet-like and dry (and may be produced with straining), or which are produced with a moisture content such that shape is not retained (including diarrhoea), do not represent normal gastrointestinal function. The precise optimum stool consistency may vary somewhat between different types of pet animals and between species of an animal,

but can be easily determined on review by a person skilled in the art.

5 Evaluation of good GI tract health and the identification of improvement of GI tract health are also techniques well known and used in the art. Colonic (or intestinal or digestive) health can be defined in terms of stool quality and pH, the presence and numbers of beneficial and potentially harmful bacteria in faeces and total and specific short chain fatty acids. Stool pH is measured using a solid phase pH electrode on faeces within 1 hour of voiding. Bacteria are sampled from freshly voided faeces and serially diluted before plating onto standard microbiological media. These plates are incubated aerobically and anaerobically at 37°C for 24 hours, after which time the number of colonies per plate are counted and used to calculate the number of colony forming units per gram of faeces. Beneficial bacteria, such as *Bifidobacteria* and *Lactobacilli* and potentially harmful bacteria, such as *Clostridia*, are identified using selective media, by reference to colony and cell morphology, using Gram stain and identification strips, such as those manufactured by bioMerieux (France). Faecal short chain fatty acids are extracted into metaphosphoric acid and analysed by gas chromatography.

20 The remaining components of the pet food product are not essential to the invention and typical standard products can be combined with the required chicory content (whole, fibre and/or pulp). Most preferably, the combined ingredients of the pet food product according to the invention provide all of the recommended vitamins and minerals for the particular pet in question, (a complete and balanced food), for example, as described in National Research Council, 1985, Nutritional Requirements for Dogs, National Academy Press, Washington D.C. or Association of American Feed Control Officials, Official Publication 1996.

- The preferred source of chicory fibres are from chicory pulp which have had at least some of the inulin removed by extraction. Preferred levels of chicory pulp for pet food products are from 0.5 to 20% dry weight of the pet food product. As will be understood by persons skilled in the art, the chicory fibre can be added in a dry or a wet form. More preferably, the chicory content level is from 2 to 10% dry weight of the pet food product. These ranges apply to the first aspect of the invention for a variety of pet animals, including animal genus and species. The invention is particularly applicable to mammalian pet animals, especially dogs, cats and horses.
- 10 The pet food product is preferably packaged. In this way, the consumer is able to identify, from the packaging, the ingredients in the food product and confirm that it is suitable for the particular pet in question. The packaging may be metal (usually in the form of a tin or flexifoil), plastic, paper or card. The pet food may be a dry, semi-moist or a moist product. Wet food includes food which is sold in tins and has
- 15 a moisture content of 70 to 90%. Dry food includes food having a similar composition, but with 5 to 15% moisture and presented as small biscuit - like kibbles. The amount of moisture in any product may influence the type of packaging which can be used or is required.
- 20 The pet food product according to the present invention encompasses any product which a pet consumes in its diet. Thus, the invention covers standard food products as well as pet food snacks (for example, snack bars, biscuits and sweet products). The food product is preferably a cooked product. It may incorporate meat or animal derived material (such as beef, chicken, turkey, lamb, fish, blood plasma, marrow
- 25 bone etc or one or more thereof). The product alternatively may be meat free (preferably including a meat substitute such as soya, maize gluten or a soya product) in order to provide a protein source. The product may contain additional protein sources such as soya protein concentrate, milk proteins, gluten etc.

The product may also contain a starch source such as one or more grains (e.g. wheat, corn, rice, oats, barley etc), or may be starch free.

5 The food product can be made according to any method known in the art, such as in Waltham Book of Dog and Cat Nutrition, Ed. ATB Edney, Chapter by A. Rainbird, entitled "A Balanced Diet" in pages 57 to 74 Pergamon Press Oxford.

10 A second aspect of the invention provides the use of chicory to i) maintain good faeces quality or improve the faeces quality of a pet and/or ii) maintain good GI tract health or improve it. The advantages of incorporating chicory into pet food products is as described according to the first aspect and the examples. The features and the preferred features of the first aspect of the invention also apply to the second aspect. Most preferably this aspect relates to the use of chicory fibre to maintain or improve good faeces quality of a pet.

15 A third aspect of the invention provides chicory, for use to i) maintain good faeces quality or improve the faeces quality of a pet and/or ii) maintain good GI tract health or improve it. Again, features and preferred features of the first and second aspects of the invention also apply to the third. Most preferably this aspect relates to the
20 chicory pulp, more preferably chicory fibre, for use to maintain or improve good faeces quality of a pet.

25 A fourth aspect of the invention provides a method to, i) maintain good faeces quality or improve the faeces quality of a pet and/or ii) maintain good GI tract health or improve it, the method comprising including chicory in the diet of a pet. The method may be, but is not restricted to, veterinarian treatment. The method may be prophylactic or therapeutic. The features and the preferred features of the first to third aspects of the invention also apply to the fourth. Most preferably the method

comprising including chicory fibre in the diet of a pet.

5 A fifth aspect of the invention provides a process for the preparation of a pet food product according to any of the first to third aspects of the invention. The process comprises mixing a form of chicory fibre with one or more ingredients of a pet food product. The product can in all other ways be produced by processes known in the art. The chicory fibre may be added prior to or following heating or cooking of one or more of the other ingredients. The process may also include the step of extracting inulin from chicory plant material. All features of aspects one to four also apply to
10 the fifth.

The invention will now be described with reference to the following, non-limiting examples:

15 EXAMPLE 1

Evaluation of Different Sources of Fibre in Pet Food by Faeces Screening Studies in Dogs.

20 Introduction

Three pet food products, each containing a different type of fibre (unrefined, unmollassed Sugar Beet Pulp, Ground Chicory fibre and Arbocel, a synthetic fibre of 100% cellulose) were used in a standard cross-over faeces screening trial in
25 number of adult dogs of the same breed. The chicory fibre was obtained following an inulin extraction process of chicory root (which reduced the inulin content of the chicory down to an approximate maximum of 10% when the pulp is dried to have a 10% moisture level). The wet chicory pulp was dried into shreds, compressed,

formed into pellets and then ground. The trial was carried out to evaluate the faeces quality performance of the inclusion of different types of fibre. The trial design was a standard cross-over.

- 5 The base pet foods used was canned chunks in gravy product. The recipe ingredients for each diet was:

Diet (Chunks Recipe)	SBP Fibre	Chicory Recipe	Arbocel
Meat and protein source	81.92	81.92	81.92
Wheat Flour	7.90	7.90	10.00
Salts	0.83	0.83	0.83
Water	6.15	6.15	6.15
Sugar Beet Pulp (SBP)	3.20	0.00	0.00
Chicory Fibre (Ground)	0.00	3.20	0.00
Arbocel	0.00	0.00	1.10
Total (%)	100.00	100.00	100.00

- 10 Differences are highlighted in bold. All recipes have a 50% inclusion of gravy (that is gravy added to the chunks at a ratio of 50/50). Gravy is water and thickening agents. All cans were processed at 125°C for 61 minutes.

Method

- 15 The faeces quality was measured in a cross-over design trial, commencing on a panel of 6 adult male Beagles. The dogs used for the trial were numbered 1 to 6.:

The dogs were offered the following amounts of diet each day (g/day based on maintenance feeding levels):

5		Dog no.					
		1	2	3	4	5	6
	Diet						
	Amount	1000	1000	1200	1600	1200	1500

10 Before the start of each trial week the dogs were fed a standard pet food with the following recipe for 2 days. This routine practice ensures a common base line for the faeces screening studies.

Diet Recipe

15	Fish and poultry	35%
	Cereals (maize, wheat)	20%
	Gravy	45%

20 Faeces quality was measured subjectively on a linear scale as previously described and analysed by ANOVA. Changes in faeces quality were also assessed on an individual day basis to identify whether an adaptation effect was occurring with time.

Results

25 Acceptance: All dogs ate 100% of the food offered over the 7 day trial.

Overall Faeces Quality

	% Ideal	% Unacceptable	Mean Score ± SEM
Diet with SBP fibre	40.20	20.70	5.3 ^a ± 0.2
Diet with Chicory fibre	60.60	9.60	6.1 ^b ± 0.2
Diet with Arbocel	39.20	21.50	5.1 ^a ± 0.2

Faeces quality for the food product with chicory fibre was good. The food product with SBP fibre and with Arbocel produced faeces with moderate/poor quality.

5

The food product with chicory fibre produced significantly better faeces quality than the food product with SBP fibre and the food product with Arbocel (ANOVA, $p < 0.05$).

10 Faeces Quality on an Individual Day Basis

With the exception of the food product with chicory fibre, there was no significant difference in faeces quality between individual days (ANOVA, $p > 0.05$), indicating that there was no adaptation effect with time.

15

Individual Dog Performance

The faeces quality for individual dogs is as follows:

Product with SBP fibre

Dog no.	Mean Score + SEM	% Ideal	% Unacceptable	No of Defaecations
1	6.0 ab \pm 0.7	45.50	0.00	11.00
2	6.6 b \pm 0.7	63.60	0.00	11.00
3	5.3 ab \pm 0.7	18.20	9.10	11.00
4	4.6 a \pm 0.5	38.10	38.10	21.00
5	4.9 ab \pm 0.5	38.90	27.80	18.00
6	5.3 ab \pm 0.5	40.00	25.00	20.00

Product with
Chicory fibre

Dog no.	Mean Score + SEM	% Ideal	% Unacceptable	No of Defaecations
1	6.7 b \pm 0.4	87.50	0.00	16.00
2	6.6 b \pm 0.4	85.70	7.10	14.00
3	6.6 b \pm 0.4	64.30	7.10	14.00
4	5.6 ab \pm 0.3	39.10	13.00	23.00
5	5.0 a \pm 0.4	27.80	16.70	18.00
6	6.3 b \pm 0.4	73.70	10.50	19.00

Product with
Arbocel

	Mean Score + SEM	% Ideal	% Unacceptable	No of Defaecations
1	6.6 c \pm 0.6	58.30	0.00	12.00
2	6.3 c \pm 0.8	71.40	0.00	7.00
3	5.7 bc \pm 0.7	27.30	0.00	11.00
4	4.1 ab \pm 0.5	38.90	38.90	18.00
5	3.7 a \pm 0.6	28.60	57.10	14.00
6	5.2 abc \pm 0.5	29.40	11.80	17.00

Within each diet, same letter means NOT significantly different (ANOVA, $p > 0.05$).

5 Discussion

The product with chicory fibre was good, producing significantly better faeces quality than the product with SBP fibre and the product with Arbocel (ANOVA, $p < 0.05$), both of which produced moderate/poor faeces quality.

10

For all diets, there was no evidence of an adaptation effect occurring with time.

EXAMPLE 2Evaluation of Different Sources of Fibres in Pet Foods Faeces Screening Studies in Dogs.

5

Introduction

Three pet food products, each containing a different types of fibre (unrefined, unmollassed Sugar Beet Pulp, Ground Chicory fibre and a standard recipe with flour instead of fibre) were used in a cross-over faeces screening trial in adult dogs.

10 The trial was carried out to evaluate the faeces quality performance of the inclusion of different types of fibre.

The base pet food is a canned chunks in gravy product. The recipe ingredients for each diet are:

15

Diet (Chunks Recipe)	SBP Fibre	Chicory Recipe	Standard
Meat and protein source	81.92	81.92	81.92
Wheat Flour	7.90	7.90	11.10
Salts	0.83	0.83	0.83
Water	6.15	6.15	6.15
Sugar Beet Pulp (SBP)	3.20	0.00	0.00
Chicory Fibre (Ground)	0.00	3.20	0.00
Total (%)	100.00	100.00	100.00

Differences are highlighted in **bold**. All recipes have a 50% inclusion of gravy (that is gravy added to the chunks at a ratio of 50/50). Gravy is water and thickening agents. All cans were processed at 125°C for 61 minutes.

5 Method

The faeces quality was measured in a standard cross-over design trial, on a panel of 6 adult dogs.

10 The dogs used for the trial were numbered :

- 7 Beagle
- 8 English Springer Spaniel
- 9 Golden Retriever
- 10 Labrador Retriever
- 11 Labrador Retriever
- 12 Miniature Schnauzer

15

The dogs were offered the following amounts of diet each day (g/day based on maintenance feeding levels):

20 Dog Number

	7	8	9	10	11	12
Diet						
Amount	1200	1200	1200	1600	1200	600

Before the start of each trial week the dogs were fed standard pet food with the following recipe for 2 days. This routine practice ensures a common base line for the faeces screening studies.

25

Diet Recipe

	Fish and poultry	35%
	Cereals (maize, wheat)	20%
5	Gravy	45%

Faeces quality was measured subjectively on a linear scale (as previously described) and analysed by ANOVA. Changes in faeces quality were also assessed on an individual day basis to identify whether an adaptation effect was occurring with time.

10

Results

Acceptance: All dogs ate 100% of the food offered over the 7 day trial.

15 Overall Faeces Quality

	% Ideal	% Unacceptable	Mean Score ± SEM
Product with SBP fibre	69.40	16.10	6.2 ^{ab} ± 0.2
Product with Chicory fibre	86.40	3.70	6.9 ^c ± 0.2
Product (Standard)	69.80	15.90	6.0 ^a ± 0.2

Faeces quality for the product with chicory fibre was excellent. Faeces produced by the product with SBP fibre and the Standard was moderate.

20

The product with chicory fibre produced significantly better faeces quality than the product with SBP fibre and the Standard product (ANOVA, $p < 0.05$).

Faeces Quality on an Individual Day Basis

- 5 For the product with SBP fibre and the Standard product, there was no significant difference in faeces quality between individual days (ANOVA, $p > 0.05$), indicating that there was no adaptation effect with time. There was no evidence that a true adaptation effect had occurred with time.

Individual Dog Performance

- 10 The faeces quality results for individual dogs are shown in the following table. For the standard product there was no significant variation in individual response (ANOVA, $p > 0.05$). For the product with chicory fibre and the product with SBP fibre, there was little significant variation in individual response.

- 15 Product with SBP
fibre

	Mean Score \pm SEM	% Ideal	% Unacceptable	No of Defaecations
Dog no.				
7	5.0 ab \pm 0.4	41.20	41.20	17.00
8	5.8 b \pm 0.6	66.70	22.20	9.00
9	6.5 ab \pm 0.6	66.70	0.00	9.00
10	6.9 a \pm 0.4	86.70	6.70	15.00
11	7.2 ab \pm 0.6	87.50	0.00	8.00
12	7.5 ab \pm 0.8	100.00	0.00	4.00

Product with
chicory fibre

Dog no.	Mean Score \pm SEM	% Ideal	% Unacceptable	No of Defaecations
7	6.0 ^b \pm 0.2	57.10	14.30	21.00
8	7.3 ^a \pm 0.3	100.00	0.00	12.00
9	7.3 ^a \pm 0.3	90.90	0.00	11.00
10	5.6 ^a \pm 0.2	100.00	0.00	19.00
11	7.2 ^a \pm 0.3	91.70	0.00	12.00
12	7.4 ^a \pm 0.4	100.00	0.00	6.00

Standard Product

Dog no.	Mean Score \pm SEM	% Ideal	% Unacceptable	No of Defaecations
7	5.4 ^a \pm 0.5	57.10	28.60	21.00
8	5.2 ^a \pm 0.6	50.00	21.40	14.00
9	7.0 ^a \pm 1.0	80.00	0.00	5.00
10	6.6 ^a \pm 0.6	85.70	7.10	14.00
11	7.5 ^a \pm 0.8	100.00	0.00	7.00
12	7.3 ^a \pm 1.5	100.00	0.00	2.00

5

Within each diet, same letter means NOT significantly different (ANOVA, $p > 0.05$).

Discussion

5 The product with chicory fibre was excellent, producing significantly better faeces quality than the product with SBP fibre and the Standard, both of which produced moderate faeces quality.

For all diets, there was no evidence of an adaptation effect occurring with time.

10 For the standard product, there was no significant variation in individual response. For the product with chicory fibre and the product with SBP fibre, there was little significant variation in individual response.

EXAMPLE 3

15 A pet food product (wet) was prepared which contained chicory fibre (ground), but no starch source. The concentrations of ingredients were as per Example 2, with the wheat flour substituted with extra meat and protein sources. Gravy was added as per Example 2. The gravy contained water and guar as the thickening agent.

20 Good results as per Examples 1 and 2 were obtained.

Other Embodiments

25 It is to be understood that, while the invention has been described in conjunction with the detailed description in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention. Other aspects, advantages, and modifications of the invention are within the scope of the claims set forth below.

CLAIMS

1. A pet food product which comprises chicory in an amount which: i) maintains
5 maintains good faeces quality or improves the faeces quality of a pet and/or ii)
maintains good gastrointestinal tract health and/or improves the
gastrointestinal tract health of a pet.
2. A pet food product, as claimed in claim 1, wherein the chicory is in the form
of chicory pulp.
- 10 3. A pet food product as claimed in claim 2, wherein the chicory pulp comprises
from 0.5 to 20% dry weight of the pet food product.
4. A pet food product, as claimed in claim 3, wherein the chicory pulp
15 comprises from 2 to 10% dry weight of the pet food product.
5. A pet food product, as claimed in any one of claims 1 to 4, wherein the pet
food is packaged.
- 20 6. A pet food product, as claimed in any one of claims 1 to 5, wherein the pet is
a dog, cat or a horse.
7. A pet food product, as claimed in any one of claims 1 to 6, which is a dry,
semi-solid or a moist product.
- 25 8. The use of chicory in i) maintaining good faeces quality or improving the
faeces quality of a pet and/or ii) maintaining good gastrointestinal tract health
and/or improving the gastrointestinal tract health of a pet.

9. The use of chicory, as claimed in claim 8, wherein the chicory is in the form of chicory pulp.
- 5 10. The use of chicory pulp, as claimed in claim 9, in an amount of from 0.5 to 20% dry weight of a product.
11. The use of chicory pulp, as claimed in claim 9, in an amount of from 2 to 10% dry weight of a product.
- 10 12. The use of chicory, as claimed in any one of claims 8 to 11, in a dry, semi-moist or a moist product.
- 15 13. Chicory, for use in i) maintaining good faeces quality or improving the faeces quality of a pet and/or ii) maintaining good gastrointestinal tract health and/or improving the gastrointestinal tract health of a pet.
- 20 14. A method for use in i) maintaining good faeces quality or improving the faeces quality of a pet and/or ii) maintaining good gastrointestinal tract health and/or improving the gastrointestinal tract health of a pet, the method comprising including chicory in the diet of a pet.
- 25 15. A method as claimed in claim 14, wherein the chicory is in the form of chicory pulp.
16. A process for the preparation of a pet food product as claimed in any one of claims 1 to 7, the method comprising mixing a form of chicory fibre with one or more ingredients of a pet food product.

17. A process as claimed in claim 16, wherein the form of chicory fibre is chicory plant or chicory pulp.
- 5 18. A pet food product comprising chicory, substantially as hereinbefore described with reference to one or more of the examples.
19. The use of chicory substantially as hereinbefore described with reference to one or more of the examples.
- 10 20. Chicory, for use as substantially hereinbefore described with reference to one or more of the examples.
- 15 21. A method for use in i) maintaining good faeces quality or improving the faeces quality of a pet and/or ii) maintaining good gastrointestinal tract health and/or improving the gastrointestinal tract health of a pet, substantially as hereinbefore described with reference to one or more of the examples.
- 20 22. A process for the preparation of a pet food product comprising chicory, substantially as hereinbefore described with reference to one or more of the examples.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/03256

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23K1/14 A23K1/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A23K A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP 0 850 569 A (NESTLE SA) 1 July 1998	1,6-8, 12-14, 16,18-22
Y	see examples 1,2,5	2,9,15, 17
Y	CH 570 117 A (EICHHOLZER AG) 15 December 1975 see column 1, line 1 - line 26 see column 3, line 30 - line 37 see column 4, line 23 - line 29 -/--	2,9,15, 17

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

12 February 1999

Date of mailing of the international search report

11/03/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Dekeirel, M

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/03256

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	<p>M. DIEZ ET AL.: "Etude des fibres alimentaires chez le chien: présentation des résultats de 7 essais expérimentaux" ANNALES DE MEDECINE VETERINAIRE, vol. 142, no. 3, 1998, pages 185-201, XP002093241 see page 185, Summary see page 187, column 2, paragraph 2 see page 188, column 1, paragraph 4 - page 189, column 1, paragraph 4 see page 195, column 2, last paragraph - column 3, paragraph 1</p>	1-4,6-22
A	<p>EP 0 293 935 A (MITSUI TOATSU CHEMICALS) 7 December 1988 see page 6, line 31 - line 34 see claims 1-3,10</p>	1
A	<p>US 4 613 377 A (YAMAZAKI HIROSHI ET AL) 23 September 1986 see column 15, line 24 - line 28 see claim 2</p>	1
A	<p>EP 0 680 782 A (SUIKER UNIE) 8 November 1995 see column 2, line 38 - line 48 see examples 2,3 see claims 1,4,6,10</p>	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/03256

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0850569	A	01-07-1998	AU 4853897 A CA 2221526 A JP 10215805 A NO 975915 A	25-06-1998 24-06-1998 18-08-1998 25-06-1998
CH 570117	A	15-12-1975	NONE	
EP 0293935	A	07-12-1988	DE 3874613 A JP 1252257 A US 4865852 A US 4971815 A	22-10-1992 06-10-1989 12-09-1989 20-11-1990
US 4613377	A	23-09-1986	CA 1246556 A	13-12-1988
EP 0680782	A	08-11-1995	US 5605114 A WO 9530479 A	25-02-1997 16-11-1997